DOCUMENT RESUME

ED 275 194 FL 016 136

AUTHOR Sorensen, Karen
TITLE Modifying an ESP Course Syllabus and Materials through a Teacher-Planned Needs Assessment.
PUB DATE 85
NOTE 24p.
PUB TYPE Reports - Descriptive (141) -- Journal Articles (080)
JOURNAL CIT MinneTESOL Journal; v5 p53-74 Fall 1985

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Agricultural Education; *Curriculum Development; Educational Needs; *English (Second Language); *English for Academic Purposes; *English for Special Purposes; Higher Education; Limited English Speaking; *Needs Assessment; Second Language Instruction; Teacher Developed Materials; Technical Writing; Writing Skills

ABSTRACT

The teacher of a course in English for special purposes (ESP) developed a needs assessment as a basis for modifying the course syllabus to prepare limited-English-speaking college students for academic work in agriculture. The needs assessment included faculty interviews and an analysis of student papers written for agriculture courses, including the comments written on the papers by the agriculture instructors. This procedure enabled the ESP teacher to determine not only what type of written work the students would be required to do in their academic programs, but also what particular aspects of the work might be especially difficult for non-native speakers of English. The latter included expressing relationships between facts and forming accurate generalizations. Based on the information gathered, the teacher then designed appropriate instructional materials for developing problem-solving and argumentation skills. (MSE)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED275194

MODIFYING AN ESP COURSE SYLLABUS AND MATERIALS THROUGH A TEACHER-PLANNED NEEDS ASSESSMENT*

Karen Sorensen

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improver
EDUCATIONAL RESOURCES INFORMAT
CENTER (ERIC)

X This document has been reproduce
received from the person or organiz
originating it.

☐ Minor changes have been made to imp
reproduction quality.

• Points of view or opinions stated in this c
ment do not necessarily represent of
OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

C. Nelson

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

FL 016 136

MODIFYING AN ESP COURSE SYLLABUS AND MATERIALS THROUGH A TEACHER-PLANNED NEEDS ASSESSMENT*

Karen Sorensen

A teacher-planned needs assessment was used to modify the syllabus of a university-level ESP course aimed at preparing students for academic work in the field of agriculture. The needs assessment included faculty interviews and an analysis of student papers written for agriculture courses — an analysis which included an examination of the agriculture instructors' written comments on student papers. The ESP teacher determined not only what type of written work the students would be required to do in their academic work but what particular aspects of this work might be expecially difficult for non-native speakers of English.

A concern with the specific reasons which learners have for studying English, and the purposes for which they will use their language skills, has given rise in the past 20 years or so to an emphasis on specialized English courses in ESL/EFL programs. The development of courses in English for specific purposes (ESP)—English for academic purposes, English for business and economics, and English for science and technology, to name but a few—has been accompanied by an increasing sophistication in the means of assessing the needs of the learners, and a growing controversy over the manner in which such needs assessments

---

Karen Sorensen, a graduate of the M.A. program in ESL at the University of Minnesota, is the director of the English Studies Program of the Hellenic American Union in Athens, Greece.

*This paper previously appeared in the ESL Working Papers, Number 2, Summer 1982, of the University of Minnesota, edited by Kathryn A. Winkler.

should be applied to curriculum design. Hutchinson and Waters (1980:1) have noted, for example, that "there is a disquieting trend towards isolating needs analysis from other aspects of teaching and learning." The complexities of conducting and using needs assessments have, they claim, made the analysis of learner's needs a specialist's affair and have, in effect, lessened the role of the classroom teacher in planning ESP courses.

This paper will show how a teacher-planned needs assessment was used to modify an ESP course syllabus and how the specific information obtained in that needs assessment was used to develop materials which differ significantly in form and concept from the materials previously used in the course. It is not my intention to propose here yet another "model" for course design, but rather to show that interested classroom teachers can still find needs assessment a manageable and effective approach to solving curriculum problems.

THE BASIS FOR A NEEDS ASSESSMENT

The view of needs assessment as a tool which facilitates curriculum design has generally implied that the needs assessment precedes the development and teaching of the course. In Mackay's model for ESP syllabus design (1981:137), for example, needs assessment would be considered an "information gathering instrument." It is seen only as a part of the initial process of curriculum design.

This view tends to downplay the value of conducting a needs assessment after the design of a course has been decided, or after it is found that an established course does not meet the needs of the students. Yet if curriculum design is seen as an ongoing process, needs assessment has special merits. It can be specific, and therefore easy to administer; it can involve the teacher and the students, who have an immediate practical interest in improving an unsatisfactory situation; and it can, in providing a clearer definition of the problem, point to appropriate solutions.

The needs assessment to be described below was conducted

in response to a syllabus problem in an advanced English for science and technology (EST) course. Though the course had been offered a number of times before, this was the first time the course was taught primarily to graduate students, and to students in one major field—agriculture. The textbook for the course, Writing Scientific English by John Swales, was chosen based on the ability level and range of interests of students in previous courses. After less than three weeks of use in this course, the text was found to be inadequate. The students demonstrated that they had already mastered its sentence-level exercises (which were predominant in the book), and had little difficulty in writing the simple experimental descriptions called for. Moreover, as they became aware that, as a group, they had very similar interests—interests which the content of the book did not emphasize—they became increasingly reluctant to work with the book.

The students, however, did express concern that their writing skills were too limited for the work they had to do in agriculture courses. Although, as Schmidt (1981:200) notes, students' intuitions about their learning needs are not always accurate, it seemed reasonable in this case to place some credence in them. These students were not engaged in pre-academic English study, but were studying EST concurrently with graduate courses in their specialties. They were already competing academically with native speakers of English. Clearly, they needed to be exposed to materials which would provide them with the skills they needed in order to succeed in their academic courses.

Of the published materials available, there are a number of advanced ESL texts which now feature technical passages as reading exercises, but very few which attempt to develop technical writing skills. Typical writing exercises in these books require students to write paragraphs based on tables and/or model paragraphs (Mountford 1977:81) or to "summarize (given) instructions in note form" (Mountford 1977:98). An exercise commonly used to elicit a longer response is one which requires an extended description, for example:

> Describe in an orderly and accurate way an instrument or piece of apparatus which is used in the science you are studying. Then prepare clear and detailed instructions for its use, employing diagrams where necessary. (Ewer and Latorre 1969:83)

The preparation for these exercises is essentially a set of grammar drills emphasizing one or more particular structures.

Exercises of this type are useful in refining grammatical skills and in providing practice in certain rhetorical patterns, but the extent to which they adequately prepare students for the kind of writing that is required in courses in their field of study has not been documented. In order to determine what type of materials might bridge the gap between the writing skills stressed in EST classes and the writing skills required in academic classes in the field of agriculture, I needed to know more about the requirements in my students' classes.

As mentioned above, EST materials, and course syllabi in general, have traditionally been based on an assessment of the learners' needs conducted before the class is offered. The syllabus and text for the specific course under consideration here had been determined prior to the decision to offer the course on the campus of the College of Agriculture, a decision which was favorable to the enrollment of agriculture students rather than engineering or liberal arts students. Here was a case, then, where an established course was not meeting the specific needs of its students—a case where a needs assessment was seen to be useful as a corrective tool.

Various methods of conducting a needs analysis for an ESP course have been delineated in the literature. Mackay (1981) stresses the value of a procedural model for the development of an ESP syllabus. He relies on "structured interviews" with both professors and students for his initial assessment tool. Schmidt (1981) has offered a cogent argument for the implementation of case studies as a means of needs assessment. The value of this approach, she asserts, lies in their being "in-depth" studies conducted "over a period of time" (Schmidt 1981:2). Munby (1980) presents an elaborate outline of the procedures to be

followed in a formal needs assessment, and Frederickson (1978) cites Taylor's conceptualization of "Needs Theory" in a detailed flow-chart of curriculum development planning stages.

The latter two approaches may be of considerable value to curriculum designers working with a copious amount of lead time, and a variety of resources in setting up a course program, but for classroom teachers looking for solutions to particular problems and working under less than ideal circumstances their complexity eclipses their utility. The approaches described by Mackay and Schmidt, on the other hand, appear less formidable. It should be noted that both appoaches were based on responses to particular situations. Each approach represents an application of available resources in solving an existing problem. It would appear that it is not the unswerving application of one approach that matters as much as the familiarity with a variety of possible approaches and the application of the approach, or combination of approaches, which best suits the specific teaching situation. The approaches which I followed in my needs assessment incorporate some of the suggestions offered by Schmidt and Mackay, but were generally less rigid, due to the pressures of time and the in-process nature of the study.

PROCEDURES

Student Questionnaire

On the first day of class I had distributed a questionnaire to the students in order to gather information on their linguistic and academic backgrounds and their interest in studying EST. Although at the time I had not intended the questionnaire to be part of a formal needs assessment, the information requested and received through it provided a good base from which to begin my study.

The survey revealed the two previously-mentioned significant facts: that the class was composed chiefly of graduate students, and that all students had majors in agriculture or closely related fields. Moreover, it identified the academic courses they were enrolled in and the instructors of these courses. A significant

number of my students were enrolled in one or more of five courses:

- Agronomy: Field Crops
- Plant Pathology for Advanced Students
- Plant Physiology: Survey
- Economics of Agricultural Production
- Statistics

Each course represented a core requirement in a particular specialty area in the College of Agriculture.

Faculty Interviews

When problems with the course text and syllabus began to surface and it seemed that a more formal needs assessment would be necessary, I decided to contact the instructors of the above-mentioned courses, and so entered into the "structured interview" step in my needs analysis. This was the most informative and rewarding portion of the study. The instructors were without exception extremely cooperative, honest, and objective about the reasoning behind their course requirements, analytical with regard to the cognitive skills necessary to fulfill these requirements, and sensitive to the needs and problems of their foreign students. It would certainly have been possible to gather the essential facts on course requirements from the printed syllabus distributed in each class, but it would have been difficult, if not impossible, to learn what specific problems the foreign students had in fulfilling the written requirements of these courses without interviewing the instructors.

During the interviews I asked the instructors for a copy of their course syllabus and discussed the course requirements with them, with specific attention to the problems of their foreign students. Since my students had cited writing as a major problem, I specifically examined the course writing requirements. The writing requirements for the five courses which I surveyed are outlined below:

Agronomy: Field Crops

A group discussion problem evaluated on the basis of both an oral and a written report. The written report: two to three pages including the approach used in analyzing the problem, an assessment of the situation presented in the problem, and proposals for obtaining more information.

Plant Pathology

Four reports (each two to five pages) evaluating four distinct "disease situations." Each report to include a selection of a likely pathogen or incitant, a description of the information needed to thoroughly analyze the problem and an explanation of why such information is important.

Plant Physiology

Selection of a journal article to analyze/critique in a 15-20 minute oral presentation.

Economics of Agricultural Production

(1) A written review and critique of three studies using theoretical concepts discussed in the course, or

(2) One paper on a relevant problem.

Statistics

Written reports on lab experiments applying statistical methods to data sets.

The amount of written work required in two of the courses, Statistics and Plant Physiology, was acknowledged by the instructors to be minimal. Since I had decided to limit my study to an assessment of the written work required of my students, I was able to focus my attention on the work assigned in Agronomy: Field Crops (henceforth, Field Crops), Plant Pathology, and Economics of Agricultural Production (EcAP). An examination of the writing requirements for these courses revealed one common and salient feature: the mention of a "problem."

Students in Field Crops are responsible for analyzing a given "problem," "collecting information and data" which they feel are needed "to tackle the problem," and writing a report in which their "proposed solution to the problem is stated." The written report on the problem has to include a statement of the approach used in analyzing the problem, and a proposal of where the information necessary to solve the problem might be obtained.

The written report required in Plant Pathology is broken down into four parts. In Part A the students are asked to select a "disease situation" (subsequently defined as a "description of an actual plant disease problem"), consider the symptoms described, decide on the most probable pathogen or incitant, and "indicate why that type of pathogen or incitant is a 'likely candidate'." They are instructed next to "discuss the environmental conditions, cropping practices, cultural practices, and other factors that...must be considered" and to explain why they judge these factors to be important. In Part B the students must describe the materials and methods they would use to "determine the true cause of the problem." Part C asks the students to "identify the pathogen that is responsible for the disease situation and explain" (instructor's emphasis) how they reached their decision. In Part D the students must summarize the problem and "recommend control measures."

Students in EcAP are given a choice between writing an "evaluation of three studies" or writing a paper on a "relevant problem" in which they will "hopefully obtain hard data relevant to the problem." The approved format for handling either choice includes (1) a statement of the problem, (2) a statement of objectives and "formulating hypotheses," (3) methodology procedures, (4) a description of the data used, (5) the presentation of the "analytical results of the study, including implications and conclusions," and (6) a "general evaluation of the study."

In the interviews with the instructors I asked whether they could make any generalizations concerning the quality of work submitted by their foreign students: did non-native speakers of English seem to have special difficulty with any parts of the problem-solving assignments? In reply, two instructors expressed concern over the difficulty some foreign students seem to have in "posing" a problem. The instructor of the EcAP course noted that his students are sometimes surprised when asked "not just to do a problem but to set it up," and the students in Plant Pathology, who are given a set of data, encounter difficulties because they "must come up with questions." The instructors in general indicated that the students have the greatest problem with the "how" and "why" parts of their reports, that is, in responding to requests to "indicate why a certain solution was chosen," "explain why these factors are judged important," or "explain how you reached your decision."

This concern with the process employed to arrive at a solution to a problem seems to place a special emphasis on the students' ability to formulate a logical argument in writing. Did this mean, then, that errors in grammar (and perhaps even in content) would be tolerated so long as the students' writing displayed a certain logic? The instructors agreed that logic was more important than grammatical correctness.

Their agreement on this supported my intuition that a course text laden with mechanical grammar drills was not the best preparation my students could have for these classes. But before I could make any changes in my course syllabus or materials I needed to know more about what was meant by

"logical" thought, and to what extent the instructors' statements about its importance in relation to grammatical correctness were true.

When asked to explain what, in their estimation, constituted logical or rational thought, the instructors could only make broad references to the use of the scientific method or the presentation of information in an "organized fashion." These explanations were helpful, but too broad to be of use in evaluating or creating EST materials which might provide practice in this area.

Lackstrom's analysis (1981) of the logical argumentation in discussion problems in EST offered more specific insights. (One of the model discussion problems analyzed by Lackstrom is reproduced in the Appendix.) Lackstrom has proposed that the model answer to discussion problems in EST is in the form of a logical argument which he characterizes as a deductive syllogism. He describes the structure of such an argument as consisting essentially of a "governing principle," which acts as the major premise of the syllogism, "relevant facts," which are applied to the governing principle (as minor premises), and a "conclusion," which is "the logical consequence of the principle plus the facts brought to bear in the course of the argument." In order to understand and form a logical argument there must be added (between the governing principle and relevant facts) statements which assert the relationship of the principle and the facts—statements which apply the facts to the principle. Lackstrom claims that these "statements of applicability" cause particular problems for students. He does not, however, offer any data showing how students fail in composing these statements.

Since the discussion problems which Lackstrom presented differ somewhat (in both their scope and the task they present) from the type of problem which students in the agriculture courses had to solve, it was not possible to directly apply his analysis to the reports required in these courses. His analysis, however, did provide a framework in which to work. His suggestion that particular facets of logical argumentation are especially difficult both conceptually and linguistically (Lackstrom 1981:25) encouraged me to investigate what particular problems

foreign students might have with logical argumentation in their reports in agriculture courses. I decided to examine a small sampling of student papers to see whether I could identify any problems similar to those Lackstrom had suggested. Since I would be working with papers which had already been corrected by the instructor, I would, at the same time, also have the opportunity to observe how grammatical errors were treated by the instructors.

Analysis of Student Papers

The papers which I examined (three written by non-native speakers and one by a native speaker) were provided by the instructor of the Plant Pathology course, and were judged by him to be representative of those submitted by the class as a whole. The report consisted of four parts. Although each part was submitted independently for evaluation, it was expected to form a complete unit. For the purpose of this paper I will focus on only one part (Part A) of the report, the part on which both native and non-native speakers received the lowest grades. Students A, B, and C are non-native speakers; Student D is the native speaker.

The task of the students in Part A of the report, as mentioned before, was to identify the likely pathogen in a given "disease situation." They were given the symptoms which marked the situation and were expected to use both that information and information obtained in the lectures, text, and literature to establish one agent as the cause of the situation, and to state why this agent was the likely cause.

Since I wanted to check the instructor's attention to both grammatical mistakes and logical flaws, my analysis of the reports was concerned with identifying two types of problems: those related to grammar and those which were related to logical argumentation. The former were easily identified; most were sentence-level errors: incorrect article usage, lack of subject-verb agreement, and faulty sentence structure. One sentence fragment and two run-on sentences also occurred. All of these errors were found in the non-native speakers' papers. None were corrected or commented on by the instructor. Errors in word

choice, punctuation, and spelling occurred in both the native and non-native speakers' papers. Of these, the only spelling error which the instructor corrected was one made by the native speaker: "funjii" for "fungi."

While this indifference to grammatical mistakes may be said to represent only one instructor's grading customs, these findings do confirm that particular instructor's actual adherence to his stated policy. Also, they lend support to the possibility that the instructors who expressed a similar attitude, and perhaps even other instructors, would regard grammatical mistakes with the same leniency. It would be useful to have more data on this from other instructors in agriculture.[1]

What is significant, however, is that the comments which the instructor made on the students' work generally did not occur where grammatical errors occurred, but were related principally to information gaps in the students' presentation of their arguments. The questions and comments which the instructor wrote on the non-native speakers' papers were generally concerned with three main problems:

(1) the mentioning of a fact without showing how it applied to the given situation,

(2) the ignoring of facts which did not fit into a convenient generalization, and

(3) the elimination of a class of factors as possible disease agents because of the characteristics of a particular member of the class.

Examples of these problems are given below, first in simplified analogies, and then in the form in which they appeared in the students' papers.

---

[1]That the instructor did not correct the grammatical errors is not to say that he was not at all affected by them in assigning grades—a separate study could be devised to test this more accurately.

(1) The mentioning of a fact without showing how it applied to the given situation. An example would be the case where, in diagnosing the death of a patient, a doctor states that a certain poison is a likely cause of death because it causes death in ducks, without specifically mentioning whether the poison has been shown to have the same effects on humans, or if ducks and humans are vulnerable to the same poisons.

Student A states that bacteria could be considered as the cause of the disease situation, and mentions one bacterium as being responsible for the symptom "birds eye spots" in tomatoes. This example is unchallenged by the professor: it refers clearly to a symptom—spots—which appears in the disease situation and to the specific plant under discussion: tomatoes. In another paragraph, however, the student states:

> Psdeudomonai phaseolicola causal agent of halo blight of bean,

which draws the comment:

> How does this apply?

He has (a) not identified this agent as a bacterium; (b) not alluded to the presence of the halo symptom in the problem; and (c) not made any connection between disease agents or symptoms in bean and tomato plants. In other words, he has not made any statement which applies this fact to the general situation described.[2]

Student A's failure to make a "statement of applicability" in relating the fact he presents about halo blight in beans to the given disease situation seems to provide some support for

---

[2]In order to realize the effect of the omission of this "statement of applicability" it is helpful to refer to the example of the logical argument which appears in the appendix.

Lackstrom's assertion that such statements can cause difficulty for students.

(2) The ignoring of facts which do not fit into a convenient generalization. As an example, consider the case of a doctor who, in diagnosing the death of a patient, posits strangulation as the cause, based on his observation of bruises around the patient's neck. In doing this, he ignores the evidence of a bullet wound in the patient's chest.

In his report, Student B states:

> Fungi and viruses seem to be considered as causal agent of these symptoms,

which elicits the questions:

> Why viruses? Do they normally cause such symptoms?

The student's argument for viruses includes the citing of two viruses which cause fruit spotting but the instructor notes:

> But what about the leaf (and) stem symptoms?

The student has disregarded two facts given in the situation in making his generalization.

(3) The elimination of a class of factors as possible disease agents because of the characteristics of a particular member of the class. An example of this would be a doctor's ruling out poison as the cause of a patient's death because one particular poison causes internal bleeding and no internal bleeding was observed.

Student C takes one symptom (necrotic spots) and notes that it can be caused by three general categories of agents: bacteria, fungi, and abiotic incitants. He then mentions one more symptom (halo chlorosis) and notes that it can be caused by two

of those agent categories (bacteria and fungi). He therefore (correctly) eliminates one category: abiotic incitants. (It is interesting to note that he does not, however, make this elimination explicit.) He then names a specific fungus which does not cause one of the symptoms (halo) and makes the conclusion:

So, causal organism is possibly bacteria...

He has used a fact associated with a specific member of a class and has applied it to all other members of the class. This mistake implies a misunderstanding of the relationships of different class members to each other, that is, what makes them form a class, and what makes them form distinct members of that class.

The native speaker, Student D, progresses along the same line of reasoning as Student C, proposing fungi, abiotic incitants, and bacteria as causes, based on one symptom, and eliminating abiotic incitants when another symptom is considered. She does not, however, further narrow down the possibilities. Instead, she (a) cites (in the form of questions) the specific disease situation facts she would need to know to do this, and (b) makes it clear how she would apply these facts in making a generalization regarding the pathogen. The following example illustrates this device:

I would like to know the pattern of infection.
(a) Is it localized around infection centers indicating a spread of infection

(b) which is common with bacteria.

The instructor's comments on the native speaker's paper do not reflect a concern with the three problems identified above, but are principally requests for more detail in the facts stated. For example, Student D's statement that

> Bacteria...usually need warmer temperatures and high humidity...

elicits the comment:

> (warmer temperatures) than what?

Both the native and non-native speakers' papers, then, drew criticism for omitting certain information. The majority of comments in the non-native speakers' papers were directly related to problems in the students' formulation of a logical argument. There were, in addition, comments which reflected the instructor's concern with a lack of thoroughness in the students' reports. For example, in Student B's paper the instructor notes:

> What else can cause necrotic spots?
> Bacteria
> Abiotic - chemicals like herbicides.

And on Student A's paper:

> Why did not (sic) exclude or not consider abiotic incitants like chemicals, etc.?

In a follow-up interview with the instructor, he emphasized that this problem of "overlooking evidence" prevented the students from making the "thorough evaluation of the various aspects of the problem" which was required.

The analysis of the argumentation in the papers allowed me to isolate, then, some specific problems which some non-native speakers had in completing a written assignment in an agriculture course, an assignment which is typical of courses in this field of study. The students, as might be expected, had problems with grammar; however, this was found to be of little consequence in the communication of their ideas. The analysis of the papers suggests that the inability to set forth a logical argument (a problem described by the instructors in the interview stage of this needs assessment) is related, in at least one kind of

problem-solving activity, to the failure to express relationships between facts and to form accurate generalizations.

CONCLUSION

The use of an error analysis of student writing in a special field, and the consideration of the point of view of the specialist teacher are not traditional steps in an ESP needs analysis project. Generally, in the "Developmental Stage" (Mackay 1981:137) an "authentic" example of the genre, such as a model report written by a native speaker, is examined and analyzed for particular linguistic structures and functions. This particular variety of language then forms the "special English" on which materials and course syllabi are based.

Including an error analysis of student papers in this needs analysis was, however, useful in at least two respects. First, it prevented me from focusing exclusively on the linguistic structures in a model report. Had I done so it is likely that I would have, as in traditional needs assessments, identified certain grammatical, rhetorical, and organizational structures as important and devised materials which emphasized these structures. But I would have had no way of knowing that correctness in these structures is less important to specialist teachers than the logical structure of the text. Analyzing the student papers, and seeing the logical shortcomings identified by the instructor, focused my attention on the kind of argumentation expected in reports in agriculture.

The instructor's comments and corrections on the papers guided my analysis allowing me to focus on the particular problems perceived by a specialist in the subject. Even more useful than this, however, was the follow-up interview I had with the instructor. At that time I was able to check my analysis and clarify points which fell between our specialty areas.

On the basis of this needs assessment, then, I was able to determine the type of written work students in university-level agriculture courses are expected to produce; moreover, I learned what particular aspects of this work might cause difficulty for

non-native speakers of English. Using these two pieces of information I was able to adjust the course syllabus and to begin designing materials which both focused on the kind of work my students would be required to do in their specialty and provided practice in the skills which they would need in order to complete this work. Realization of the need for practice in selecting and organizing data, posing problems, and drawing conclusions, for example, suggested the design of a data-gathering research project in which the students would work together collecting data, forming hypotheses, and writing a report on their findings. The emphasis in this activity was placed on logical argumentation rather than on grammatical accuracy, although the students did receive practice in the grammatical and rhetorical structures which contributed to the expression of their arguments (for example, practice in making comparisons and using words such as since and therefore to make conclusions explicit.)

Designing materials which would develop the students' ability to express relationships between facts and form accurate generalizations proved to be a challenging task which could not be completed within the academic quarter. However, having a better understanding of the thought process involved in performing the problem-solving activity—knowing, in a sense, some of the building blocks of the process—helped me tremendously in determining how other materials might be used to develop this skill. For example, it would seem practical, in doing checks on reading comprehension, to use multiple choice questions in such a way that the relative value of each alternative is debated and the "whys" and "why nots" of the students' choices are actively discussed. It seems likely, too, that cloze exercises could be used to develop problem-solving skills. In these exercises students are presented with "data" and must supplement the data with other facts they know (generalizations they have been able to make regarding English usage). The students must decide what data to eliminate, what clues are useful, etc., and form a conclusion. If the students are encouraged to argue, and state why they make certain choices, and if as much attention is placed on the process of obtaining the correct answer as on the answer itself, then it seems likely that they will develop an

awareness of the kind of argumentation expected in problem-solving exercises.

This paper has shown how the information obtained in a teacher-planned needs assessment was instrumental in making necessary modifications in the design of a course, and in designing the type of materials which could be used in a course with the specific purpose of preparing students for academic work in the field of agricuture. While a number of refinements could have been made in the procedures followed, the assessment as it was conducted (under a variety of constraints similar if not identical to those incumbent on most classroom teachers) did prove to be a practical and effective curriculum design tool.

REFERENCES

Ewer, J.R., and G. Latorre. 1969. A course in basic scientific English. London: Longman Group Ltd.

Frederickson, Charles. 1978. How to develop an English for specific purposes (ESP) curriculum. In English for specific purposes: science and technology, Mary Todd Trimble, Louis Trimble, and Karl Drobnic (Eds.). Corvallis, Oregon: English Language Institute, Oregon State University.

Hutchinson, Tom, and Alan Waters. 1980. ESP at the crossroads. English for Specific Purposes 36:1-6.

Lackstrom, John E. 1981. Logical argumentation: the answer to the discussion-problem in EST. In Selinker et al., 12-22.

Mackay, Ronald. 1981. Developing a reading curriculum for ESP. In Selinker et al., 134-145.

Mountford, Alan. 1977. English in focus: agriculture. London: Oxford University Press.

Munby, J. 1978. Communicative syllabus design. London: Cambridge University Press.

Schmidt, Maxine F. 1981. Needs assessment in English for specific purposes: the case study. In Selinker et al., 199-210.

Selinker, Larry, Elaine Tarone, and Victor Hanzeli (Eds.). 1981. English for academic and technical purposes: studies in honor of Louis Trimble. Rowley, Mass.: Newbury House.

Swales, John. 1971. Writing scientific English. London: Thomas Nelson and Sons, Ltd.

APPENDIX

The Logical Argument in EST as Presented in a Model Discussion Problem (an example reproduced from Lackstrom, 1981)

Statement of the Problem	1 2 3 4	The question of whether our universe is actually "pulsating" or "hyperbolic" should be decidable from the present rate of its expansion.
Statement of Applicability	5 6 7	The situation is analogous to the case of a rocket shot from the surface of the earth.
General Principle	8 9 10 11 12 13 14 15	If the velocity of the rocket is less than seven miles per second—the "escape velocity"—the rocket will climb only to a certain height and then fall back to the earth...On the other hand, a rocket shot with a velocity of more than seven miles per second will escape from the earth's gravitational field and disappear in space.
Statement of Applicability	16 17 18 19 20 21	The case of the receding system of galaxies is very similar to that of an escape rocket, except that instead of just two interacting bodies (the rocket and the earth) we have an unlimited number of them escaping from one another.
Related Facts	22 23 24	We find that the galaxies are fleeing from one another at seven times the velocity necessary for mutual escape.
Conclusion	25 26 27	Thus we may conclude that our universe corresponds to the "hyperbolic" model, so that its present expansion will never stop.

Comments: In the argument presented above, note how the "related facts" in lines 22-24 are connected to the "general

principle" (lines 8-15) by the "statement of applicability" (lines 16-21). "Galaxies" are mentioned in the statement of the facts, "a rocket" in the statement of the general principle. Both statements refer to "escape" (and) "velocity." The intervening statement of applicability relates the two statements by making a direct comparison between "a receding system of galaxies" and "an escape rocket." The importance of this statement in the logical argument can be seen by reading lines 8-24, omitting lines 16-21.